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Draft Zambian Standard

Ethanol gel for cooking and other gel burning appliances

DRAFT STANDARD FOR PUBLIC COMMENTS

ZAMBIA BUREAU OF STANDARD

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This Draft Zambia Standard was prepared by the Renewable Energy Technical Committee, (TC 4/20), upon which the following organizations were represented:

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TABLE OF CONTENTS

FOREWORD	iv
1.0 SCOPE	1
2.0 NORMATIVE REFERENCES	1
3.0 DEFINITIONS AND ABBREVIATIONS.....	1
4.0 REQUIREMENTS.....	2
4.1. Viscosity	2
4.2. Shelf life.....	2
4.3. Composition.....	2
4.4. Flashpoint.....	2
4.5. Safety in the use of the gel.....	2
4.6. Calorific Value.....	2
4.7. Performance	2
5.0 TEST METHODS.....	3
6 PACKING AND MARKING	4
ANNEX A.....	6
Sampling and compliance with this standard.....	6
A1. Sampling	6
A2. Compliance	6

FOREWORD

The Zambia Bureau of Standards (ZABS) is the Statutory Organization established by an Act of Parliament. ZABS is responsible for the preparation of national standards through its various Technical committees composed of representation from government departments, the industry, academia, regulators, consumer associations and non-governmental organizations.

This Draft Zambian Standard has been prepared with assistance drawn from: SANS 448:2010 “*Ethanol gel for cooking and other gel burning appliances*”, published by South African National Standard (SANS) and in accordance with the procedures of ZABS. All users should ensure that they have the latest edition of this publication as standards are revised from time to time.

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ZAMBIA BUREAU OF STANDARDS

Draft Zambian Standard

Ethanol – Gel Fueled Appliances for cooking and other gel burning appliances

1.0 SCOPE

This Draft Zambian Standard covers the requirements for ethanol gel for cooking and for other gel burning appliances.

2.0 NORMATIVE REFERENCES

The under listed documents contain provisions which, through reference in this text, constitute provisions of this standard. All documents are subject to revision and, since any reference to a document is deemed to be the latest reference to the latest edition of that document, parties to agreements based on this standard are encouraged to take steps to ensure the use of the most recent editions of the documents indicated below. Information on currently valid national and international standards may be obtained from the Zambia Bureau of Standards:

EN 24260	Petroleum products and hydrocarbons – Determination of sulfur contents – Wickbold combustion method
ISO 1516	Determination of flash/no flash – Closed cup equilibrium method.
ISO 1523	Determination of flash point – Closed cup equilibrium method.
ISO 3104	Petroleum products – Transparent and opaque liquids – Determination of kinematic viscosity and calculation of dynamic viscosity.
ISO 3219	Plastics – Polymers/resins in the liquid state or as emulsions or dispersions – Determination of viscosity using a rotational viscometer with defined shear rate.
ISO 3679	Determination of flash point – Rapid equilibrium closed cup method.
ISO 3680	Determination of flash/no flash – Rapid equilibrium closed cup method.
ISO 3837	Liquid petroleum products – Determination of hydrocarbon types – Fluorescent indicator adsorption method.
ISO 8317	Child-resistant packaging – Requirements and testing procedures for reclosed packages.
SANS 1518	Transport of dangerous goods – Construction, testing, approval and maintenance of road vehicles and portable tanks
ISO 1928	Coal and coke – Determination of gross calorific value .
SANS 10229-1	Transport of dangerous goods – Packaging and large packaging for road and rail transport – Part 1: Packaging.
SANS 10232-1	Transport of dangerous goods – Emergency information systems – Part 1: Emergency information system for road transport.
SANS 10233	Transport of dangerous goods – Intermediate bulk containers for road and rail transport.
ZS 708	Globally harmonized System of classification and labelling of chemicals (GHS).

3.0 DEFINITIONS AND ABBREVIATIONS

For the purpose of this Standard, the following definitions shall apply.

3.1. Acceptable: acceptable to the authority administering this standard, or to the parties concluding the purchase contract, as relevant.

3.2. Abbreviations

N.O.S. not otherwise specified

4.0 REQUIREMENTS

4.1. Viscosity

When determined in accordance with either ISO 3104 or ISO 3219, the dynamic viscosity of the gel shall not be less than 25 000 cP at 25 °C and the rotation speed shall be 3 rpm.

4.2. Shelf life

The gel shall meet all requirements in this standard after 3 months of storage at temperatures ranging from 20 °C to 35 °C.

4.3. Composition

4.3.1. The ethanol gel shall not contain any substance or preparation classified as toxic, corrosive, oxidizing, sensitizing or carcinogenic in accordance with ZS 708 or any other that may cause harm.

4.3.2. The properties of any raw material for the fuel component of the ethanol gel shall comply with the following:

- a) aromatic content of not more than a mass fraction of 2.0 % when determined in accordance with the test method given in ISO 3837; and
- b) sulfur content of not more than a mass fraction of 0.05 % when determined in accordance with a test method given in EN 24260.

4.3.3. The ethanol used to make the ethanol gel shall be denatured with a denaturant approved by the relevant institution in Zambia.

4.3.4. The ethanol content of the gel (expressed as 100 % ethanol) shall be not less than a mass fraction of 80 % as indicated in the product Material Safety Data Sheet (MSDS).

4.4. Flashpoint

When determined in accordance with the test methods given in ISO 1516, ISO 1523, ISO 3679 or ISO 3680, the flashpoint of the ethanol gel shall be not less than 23 °C.

4.5. Safety in the use of the gel

When tested in accordance with the test given in 5.1, the ethanol gel shall ignite readily and shall burn steadily, without flaring, sudden deflagrations, sparking, spitting, popping, dripping or explosion, from ignition until it has burned to extinction.

4.6. Calorific Value

When determined in accordance with ISO 1928, the net calorific value of the fuel shall be not less than 18 MJ/kg.

4.7. Performance

4.7.1. When the ethanol gel fuel is tested in accordance with 5.2, it shall heat 1 L water from 25 °C to 90 °C in not more than 15 min.

4.7.2. The residue of the fuel that is burnt to completion in the procedure described in 5.2.2 shall be not more than a mass fraction of 5 % of the fuel.

5.0 TEST METHODS

5.1. Safety in the use of the ethanol gel.

5.1.1. Test apparatus

- 5.1.1.1. **Laboratory fume cupboard** operated at the minimum extraction rate necessary to just safely evacuate the products of combustion produced by the burning ethanol gel.
- 5.1.1.2. **Fireproof bowl** with dimensions of approximately 125 mm in diameter and 35 mm in depth.
- 5.1.1.3. **Ignition source**, gas-based.
- 5.1.1.4. **Calibrated balance**.
- 5.1.1.5. **Stopwatch**, calibrated in seconds.

NOTE In the interest of safety it is recommended that the hands and face of the tester be adequately protected at all times when undertaking this test.

5.1.2. Ethanol gel test

Use the ethanol gel sampled in accordance with the sampling procedure given in annex A.

5.1.3. Procedure

- 5.1.3.1. Switch on the extractor fan of the cupboard and operate at the minimum extraction rate necessary to just safely evacuate the products of combustion produced by the burning ethanol gel.
- 5.1.3.2. Fill the aluminium bowl with 50 g of the ethanol gel. Place it on an isolating pad inside the fume cupboard and ignite immediately.
- 5.1.3.3. Observe the ethanol gel on ignition and immediately thereafter and record any signs of flaring, sudden deflagrations, sparking, spitting, popping, dripping or explosion.

5.2. Combustion performance

5.2.1. Test apparatus

- 5.2.1.1. **Test appliance**, a tripod with a height of 7 cm between the top of the pot seat and the top surface of the gel container.
- 5.2.1.2. **Laboratory fume cupboard** (see 5.1.1.1).
- 5.2.1.3. **Fireproof bowl** (see 5.1.1.2).
- 5.2.1.4. **Ignition source** (see 5.1.1.3).
- 5.2.1.5. **Calibrated balance** (see 5.1.1.4).
- 5.2.1.6. **Stopwatch** (see 5.1.1.5).
- 5.2.1.7. **Aluminium pot**, flat-bottomed 2 L aluminium pot of 220 mm diameter fitted with a thermocouple port.
- 5.2.1.8. **Thermocouple**.

5.2.2. Procedure

- 5.2.2.1. Ensure that the ambient air temperature of the laboratory is maintained at $20\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$.

- 5.2.2.2. Switch on the extractor fan of the cupboard and operate at the minimum extraction rate necessary to just safely evacuate the products of combustion produced by the burning ethanol gel.
- 5.2.2.3. Pour 1 L of tap water into the aluminium cooking pot.
- 5.2.2.4. Fill the fireproof bowl with 200 g of the ethanol gel. Ignite the fire with the gas lighter.
- 5.2.2.5. Place the aluminium pot with water onto the fire. Record the time taken for the water temperature to rise from 25 °C to 90 °C.

6 PACKING AND MARKING

6.1. Packing

- 6.1.1. The condition of containers at the point of sales to consumers, whether they are drums, intermediate bulk containers or road tank vehicles, shall be such as not to be detrimental to the quality of the ethanol gel during normal transport and storage and shall comply with the relevant requirements of the following standards:
 - a) SANS 10229-1, in the case of drums;
 - b) SANS 10233, in the case of intermediate bulk containers;
 - c) SANS 10234, in the case of packaging for consumers at the point of sales; and
 - d) SANS 1518, in the case of road tank vehicles.
- 6.1.2. The packing shall be impervious to the fuel when tested in accordance with the recommended practice. The containers of the ethanol gel shall have a screw top.

6.2. Marking

- 6.2.1. The information on each
 - a) drum shall be in accordance with SANS 10229-1;
 - b) intermediate bulk container shall be in accordance with SANS 10233;
 - c) road tank vehicle shall be in accordance with SANS 10232-1;
 - d) container for sale to consumers shall be in accordance with SANS 10234, and shall bear the
 - e) following information in prominent legible and indelible marking:
 - i) The manufacturer's/distributor's trade name and trademark ;
 - ii) Words indicating that the product is ethanol gel;
 - iii) Directions regarding the safe handling, use and storage;
 - iv) Suitable identification (in the form of the batch number or date of manufacture); and
 - v) The net mass of the contents.
- 6.2.2. For the labeling, placarding and preparation of shipping documents for fuel that complies with the requirements of this standard, the following shall apply:

- a) the hazard-class diamond, as for class 4 dangerous goods;
- b) the proper shipping name: “FLAMMABLE SOLID, ORGANIC, N.O.S. (ethanol gel)”;
- c) the substance identification number (SIN): 1325; and
- d) other information including the supplier’s brand name or trademark, the description “ETHANOL GEL”, quantity and minimum percentage ethanol content of the ethanol gel.

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ANNEX A **(Normative)**

Sampling and compliance with this standard

A1. Sampling

A.1.1. General

The sampling procedure given in A.1.3 shall be applied in determining whether a lot complies with the relevant requirements of this standard. The samples so drawn shall be deemed to represent the lot.

A.1.2. Definitions

A.1.2.1.

Defective

Test sample of the ethanol gel that fails in one or more respects to comply with the relevant requirements of this standard

A.1.2.2.

Lot

That quantity of ethanol gel in containers bearing the same trade name or trademark, grade designation and batch identification, from one manufacturer, and submitted at any one time for inspection and testing

A.1.3. A.1.3 Samples for inspection and testing

After checking the lot for compliance with the relevant requirements of 6.1 and 6.2, take from it at random.

- a) five containers, if the lot is packed in containers of net mass not exceeding 5 kg; and
- b) three containers, if the lot is packed in containers of net mass exceeding 5 kg.

A2. Compliance

Deem the lot to comply with the relevant requirements of this standard if, on inspection of the containers or tankers in the lot, and on testing of the samples taken in accordance with A.1.3, no defective is found.